Clinical features of meningococcal arthritis: a report of four cases

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SUMMARY Four patients with *Neisseria meningitidis* infection complicated by arthritis are described. Three patients had an acute polyarthritis which responded quickly to antimicrobial therapy. A fourth patient developed a prolonged arthritis which occurred after the initial infection had been successfully treated. Tenosynovitis occurred as a complication in one case. Attention is drawn to possible confusion with gonococcal infection, and postulated pathological mechanisms are discussed.

Key words: meningococcal infection, arthritis.

Arthritis complicating *Neisseria meningitidis* infection has been recognised since the time of the earliest descriptions of the disease. At least three different clinical presentations are recognised. This report describes four patients with acute meningococcal infection and arthritis presenting during a meningococcal epidemic which occurred in a small New Zealand community (Table 1). Six patients with meningococcal infection presented to the same hospital within one month, and a further patient was treated by his general practitioner.

These patients illustrate that arthritis indistinguishable from gonococcal arthritis may be the only clinical manifestation of the disease and that a persistent sterile arthritis similar to other forms of reactive arthritis may occur.

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Case reports

CASE 1

A 17-year-old carpenter was admitted to hospital with a five-day history of fever, myalgia, and a sore throat. Three days before admission he developed a macular rash on his arms and legs, followed by pain and restriction of movement in his ankles, elbows, and knees. On admission his temperature was 38.3°C, and he had a macular rash on his arms, legs, and trunk. Both ankles, left knee, and right elbow were warm, swollen, and tender. A tenosynovitis involving the flexor tendons of the right middle finger was present. The patient denied any sexual contact for the preceding eight months. Investigations showed haemoglobin 148 g/l (14.8 g/dl), white cell count $10.6 \times 10^9/l$, with a marked left shift. Knee aspiration produced 15 ml of straw-coloured turbid fluid containing 65 000 white cells/mm³ ($65 \times 10^9/l$), predominantly polymorphic with no bacteria on

Table 1 *Meningococcal arthritis clinical particulars*

Case	Age and sex	Day of arthritis onset	Duration (days)	Skin lesions	Meningitis	Bacteriological studies			
						Blood	CSF	Pharynx	Group
1	17 M	2	6	+	-	-	NP	+	B
2	17 F	2	5	+	-	+	NP	+	B
3	56 M	6	30	+	+	+	+	-	B
4	14 M	1	2	+	-	+	NP	NP	C

NP=not performed.

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crystals. Culture of the fluid was sterile. Blood cultures were also sterile. Urethral and throat swabs grew *Neisseria meningitidis* group B. A midstream urine showed 190×10^9 leucocytes/l but was sterile. The patient was treated with oral penicillin V 1 g six hourly and indomethacin 50 mg twice daily. By the following day his temperature had returned to normal, the rash had begun to fade, and his joint symptoms had lessened. He was free of symptoms three days after treatment.

CASE 2

A 17-year-old girl presented to the hospital three days after case 1 with a four-day history of arthralgias, malaise, fever, and a rash. On examination she had a temperature of 38.3°C and a macular papular rash over the limbs and lower trunk. Several purpuric lesions were noted on the lower legs. The left elbow was warm, swollen, and tender. Neurological examination was normal. Investigations showed haemoglobin 127 g/l (12.7 g/dl), white cell count $9.3 \times 10^9/\text{l}$ (83% neutrophils), erythrocyte sedimentation rate (ESR) 92 mm/h. Blood cultures and a throat swab grew *Neisseria meningitidis* group B. She was treated with penicillin V 4 g daily for 10 days with complete remission of all symptoms and signs after 36 hours.

CASE 3

A 56-year-old man was well until two days before admission when he developed neck pain accompanied by fever and malaise. Over the following day he had rigors and became mentally obtunded. On the day of admission he became non-responsive. A rapidly evolving rash over his trunk and limbs was observed by relatives. On admission he was comatose with a temperature of 38.9°C . Petechial lesions were present over the trunk and limbs. The neck was stiff. Investigations showed haemoglobin 170 g/l (17.0 g/dl), white cell count $8.8 \times 10^9/\text{l}$, with marked shift. The cerebrospinal fluid (CSF) was turbid with 2485×10^6 leucocytes/l (100% polymorphs). Gram-negative cocci were observed, and subsequent culture showed *Neisseria meningitidis* group B, which was also isolated from blood culture. The patient was treated with intravenous penicillin 20 MU per day. Thereafter his mental status improved, and he regained consciousness, though he remained confused for three days. His temperature settled after two days. Four days after hospital admission the patient complained of pain in his knees and ankles. Examination showed these joints to be warm, tender, and swollen. No diagnostic aspiration was attempted, and he was treated with analgesic agents. Over the next week the ankles and right knee resolved. An effusion persisted in the left knee for

one month. Serum complement studies performed on the day before development of arthritis showed decreased C3 of 700 mg/l (normal 800-1500 mg/l) but normal C4 levels. Repeat studies performed one month later were normal.

CASE 4

A 14-year-old Australian schoolboy on a football tour of New Zealand presented to hospital with a two-day history of malaise, dry cough, headache and a one day history of pain and swelling of the left knee and ankle. On examination he had a temperature of 37.2°C and a non-itchy macular rash on his chest, abdomen, and arms. The right knee was warm and tender with a small effusion. Investigations showed haemoglobin 150 g/l (15 g/dl), white cell count $14.1 \times 10^9/\text{l}$, with a normal differential. Blood cultures grew a *Neisseria meningitidis* group C. He was subsequently treated with oral penicillin V 1 g daily for 10 days and made a complete recovery. His joint symptoms settled after one day of treatment.

Discussion

Neisseria meningitidis causes epidemic and sporadic disease. Three of the cases described presented within three days of one another, admitted to recent social contact, and came from the same area. All grew *Neisseria meningitidis* group B on culture. Although presenting at the same time, case 4 grew *Neisseria meningitidis* type C and therefore must be considered a sporadic case.

Arthritis complicates acute meningococcal infection in between 2 and 10% of cases.¹ Of the seven patients in this epidemic, four had arthritis. Three clinical forms are recognised – as a complication of acute meningococcal disease or chronic meningococcaemia and rarely primary meningococcal arthritis.²

The clinical presentations of case 1, 2, and 4 with fever, variable skin lesions, and polyarthritis are non-specific and bear a close resemblance to gonococcal infection. Indeed it can be impossible to separate gonococcal from meningococcal disease except by culture.³ Acute tenosynovitis is said to be a distinguishing feature, as it occurs in 68% or more cases of gonococcal arthritis.⁴ However case 1 had unequivocal tenosynovitis, which casts doubt on the usefulness of this sign as a differentiating feature. This further emphasises the need for culture proof before accepting the diagnosis of gonococcal arthritis.

The time of onset and duration of the arthritis complicating acute meningococcal disease vary considerably, and it is not clear whether antibiotic

therapy affects the course of the arthritis in patients with sterile effusions.² Cases 1, 2, and 4 presented with acute arthritis early in the course of the disease and appeared to respond quickly to antimicrobial therapy. This is consistent with both a local inflammatory response to bacteria in the extrasynovial tissue or a non-infective immunological response (a reactive arthritis). Case 3, however, developed an acute oligoarthritis persisting for a month after antimicrobial therapy. This was associated with a fall in complement, though changes in complement levels and the presence of immune complexes have been documented in uncomplicated acute meningococcaemia.⁵ This persistent sterile arthritis is similar to that following gonococcal infection, when it may be confused with an incomplete Reiter's syndrome.⁶

Until recently two forms of arthritis complicating acute meningococcaemia were recognised – an early onset transient acute polyarthritis and a late transient subacute mono- or oligoarthritis characterised by large effusions and a more prolonged course. The oligoarthritis often occurred after treatment at a time when the meningococcal infection appeared to be settling.⁷ Subsequent series have not shown this pattern, and the relationship between the onset of symptoms and appearance of arthritis has varied between one and 12 days.^{2, 8}

The pathological mechanisms causing these various clinical presentations remain uncertain. It is possible that arthritis results from bacteria multiplying in the synovium and extrasynovial tissues, and this is probably the cause of the arthralgia or

arthritis which occurs in the bacteraemic phase of the infection.⁸ Sterile effusions occurring after successful treatment probably represent a reactive arthritis, and indirect evidence for this includes the presence of circulating immune complexes, a fall in serum complement, and deposits of meningococcal antigen, immunoglobulin, and complement in the synovium and synovial fluid leucocytes.^{5, 9-11}

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